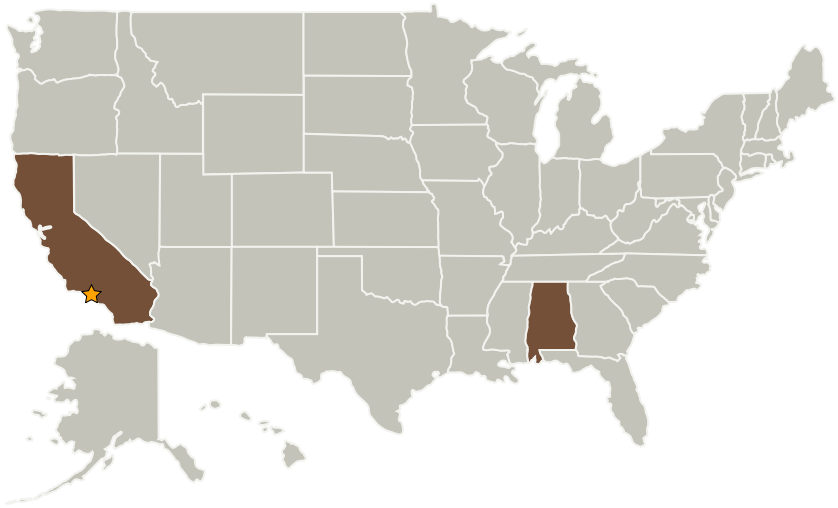
Computer Aided Design Tools for Extreme Environment Electronics, Phase I

Completed Technology Project (2006 - 2006)

Project Introduction

This project aims to provide Computer Aided Design (CAD) tools for radiation-tolerant, wide-temperature-range digital, analog, mixed-signal, and radio-frequency electronic components suitable for operation in the extreme environments of the Moon, Mars, and other deep space destinations. All such exploration systems will need reliable electronics able to operate in a wide temperature range (-230°C to +130 ?C) and high radiation levels. There is very little knowledge of semiconductor device behavior in extreme low temperatures (currently ongoing research) and no reliable models or design tools. CFDRC will develop first commercial-quality validated models and CAD tools for predicting the electrical performance and reliability of electronic components in extreme low temperatures, with included radiation effects and reliability analysis, using coupled semiconductor and thermal-mechanical simulation. This work will use and implement the newest data from the ongoing NASA Exploration Systems and Research Technology (Code ES&RT) program, led by Prof. Cressler at Georgia Tech (subcontractor in this proposal), involving JPL, BAE, Boeing, Vanderbilt, and others, aimed at developing electronics technology for mixed-signal circuit applications for lunar (to -230?C) applications. Reliable and validated CAD tools will help to predict electronics performance and radiation response in the extreme temperatures, and reduce the amount of testing cost and time.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
CFD Research Corporation	Supporting Organization	Industry	Huntsville, Alabama

Primary U.S. Work Locations	
Alabama	California

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  - TX02.3 Avionics Tools, Models, and Analysis
    - TX02.3.2 Space Radiation Analysis and Modeling